

stork. When daylight broke we could see that the sea was strewn with the bodies of birds that had apparently been caught in the gale ashore and had been carried out to sea. When the gale furiously recommenced at 5 a. m., it blew from the north. As the day wore on it turned slowly to the westward. We subsequently learned that the gale had passed over Frontera, and had done some damage farther south on the isthmus. The gale was over by the morning of the 8th, when the ship anchored near the Champotan Shoals.

The approach of the storm was indicated by reports from the middle Gulf coast on the morning of the 10th, and by the night of that date the center of disturbance had crossed the Gulf coast line near Mobile, Ala. At this time the storm had lost the hurricane intensity it possessed over the southern Gulf. The lowest barometer reading reported at 8 p. m. of the 10th was 29.72 inches at Mobile, and the maximum wind velocity noted on that date was 42 miles an hour at New Orleans, La. During the 11th the depression deepened, and in the evening the central pressure, 29.48 inches, appeared over southern Virginia and northern North Carolina. During the 12th the storm passed northeastward off the middle Atlantic and New England coasts with evidence of increased strength, and vessel reports show that the gales that attended its passage over the Atlantic were of unusual violence. Morning reports of the 15th from the British Isles showed 24-hour pressure falls of one-half to three-quarters of an inch on the west and north coasts. On the morning of the 16th pressures were below 29.00 inches at stations in the north of Scotland, and the presence of a storm center slightly to the southward of the Orkney Islands was indicated. From this position the disturbance passed eastward over the North Sea.

Ample and timely warnings were issued to all United States ports regarding the course and character of this storm.

A disturbance that appeared over the east part of the Gulf of Mexico on the 25th moved northeastward along the Atlantic coast to New England, where it deepened and caused high winds on the 28th.

On the Great Lakes the severest storm of the month occurred on the 12th and 13th. This storm first appeared as a shallow depression over the central valleys of California on the 10th. During the 10th and 11th the depression moved eastward to the middle Rocky Mountain region and during the 12th it deepened rapidly and passed north of east to eastern Iowa. By the morning of the 13th the center of disturbance had reached the northern part of Lake Huron, with minimum reported barometer 29.22 inches at Alpena, Mich., and wind velocities of 56 miles an hour at Chicago, Ill., and 42 miles an hour at Cleveland, Ohio, and Buffalo, N. Y. During the succeeding 24 hours the storm advanced over the St. Lawrence Valley with maximum wind velocity of 60 miles an hour at Buffalo, N. Y. Vessel interests were fully advised of the approach of the storms referred to.

On the Pacific coast the severest storm of the month occurred on the north coast on the 27th. Storm warnings were hoisted on the Washington coast the morning of the 27th and the wind increased to gale force in the afternoon without, however, causing any damage to shipping.

The most important frosts of the month occurred from the 14th to 16th and from the 28th to the 31st. On the 14th frost was reported in the lower Missouri Valley and in the Mississippi Valley as far south as northern Arkansas. On the morning of the 15th frost was noted generally from the Ohio Valley to central portions of the middle and east Gulf States. On the 16th frost occurred from the central parts of the east Gulf States over the interior of the South Atlantic States. On the morning of the 28th frost was observed in the Middle-western States. By the 29th the frost area had extended over the interior of the middle and east Gulf and South Atlantic States. On the 30th frost occurred in the interior of the east Gulf and South Atlantic States and thence to the North Carolina coast. Frost was also reported on the 31st generally over North Caro-

lina. In regions where crops were subject to damage by frost, warnings were distributed on the days preceding its occurrence.

In California rain warnings were of value to fruit dryers and raisin makers.

At the close of the month there was evidence of a disturbance south of eastern Cuba. This disturbance moved north-eastward over Santo Domingo and the Atlantic Ocean during the early days of November, 1902, and will be discussed in the MONTHLY WEATHER REVIEW for that month.

BOSTON FORECAST DISTRICT.

The storm of the 28th was quite severe along the northern coast, the wind being from east and southeast, and shipping was delayed and some damage resulted. Warnings were displayed well in advance of the storm. The first killing frost of the season occurred on the 22d, and was announced twenty-four hours in advance. Considerable benefit was derived from the warnings.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

Storm warnings were issued for the Louisiana and Mississippi coasts on the 10th and 22d, and both were fully justified. Two vessels were lost in the storm of the 22d. The steamer *Palor City* sunk in the river as a result of the steamer *Natches* being blown against her. A three-masted schooner, the *La Plata*, went aground on the Chandeleur Islands, Miss. Frost, for which warnings were issued, occurred in Arkansas on the 14th, 28th, and 29th.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

The stormy season which set in earlier than usual during September continued through the month of October, with increasing severity. It is probable that the daily forecasts and storm warnings were of great benefit to marine interests, as no important casualties have been reported.—*H. J. Cox, Professor.*

DENVER FORECAST DISTRICT.

With the exception of a frost warning sent to a few points in the extreme southeastern part of Colorado on the morning of the 3d, no special warnings were issued.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

Rain warnings were issued to fruit dryers and raisin makers throughout the State, and at nearly all points trays were stacked before the rains began. Storm warnings were displayed on the northern California coast on the 21st and 22d. Incoming mariners reported severe weather outside on those dates.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

Frost forecasts were discontinued after the season of danger to crops had passed. Storm warnings were ordered for three disturbances, the most severe of which occurred on the 27th. *E. A. Beals, Forecast Official.*

RIVERS AND FLOODS.

The usual autumnal quiet of the rivers was not disturbed during October except in the Middle and South Atlantic States where there were occasional interruptions of limited duration and extent, caused by the heavy rains that are the almost invariable accompaniments of storms of the southwestern and Gulf of Mexico types. The first was a moderate flood in the James and Roanoke rivers from the 6th to the 8th, inclusive, the result of heavy rains over southern, and particularly over

southwestern Virginia, from a storm of the southwestern type. The rains also extended over the headwaters of the South Carolina rivers, causing rapid though not alarming rises, which were repeated in a lesser degree after the Gulf storms of the 11th and 27th. The latter storm also occasioned the rise of the 29th and 30th in the north branch of the Susquehanna River, but the crests reached were several feet below the danger lines.

The danger line was reached on the 6th at Richmond, Va., and exceeded by over five feet on the 8th at Weldon, N. C. At the former place the water reached the steamship docks, necessitating the removal of a large amount of freight. Much other property along the river front was also removed to places of safety. The usual Weather Bureau warnings of the approaching flood were issued in ample time to permit this work to be done effectively and without undue haste. The Roanoke flood apparently caused no damage worthy of mention.

The rivers to the westward changed but little, although the mean stages in the Ohio were somewhat higher than during September. The suspension of through navigation between Cincinnati and Pittsburg continued, although local traffic for light draught boats was possible between intermediate points the greater portion of the month. River traffic on the Alabama River above Selma, Ala., was suspended on the 26th on account of the extremely low stage of the river, and again at Chattanooga, Tenn., on the 6th. It was resumed at the latter place on the 14th, but was again suspended on the 18th.

The highest and lowest water, mean stage, and monthly range at 143 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on

the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	30, p. m. *	47	122	5, a. m.	45	64	3,350	4.5	744	81.0
II.....	1, p. m.	51	120	9, p. m.	37	76	2,800	3.5	800	33.3
III.....	6, a. m.	49	109	11, a. m.	42	70	1,900	3.5	543	22.6
IV.....	8, a. m.	53	105	15, p. m.	35	82	1,900	3.0	633	26.4
V.....	13, a. m.	41	101	18, p. m.	46	60	1,150	2.5	460	19.2
VI.....	15, a. m.	47	101	22, a. m.	42	72	1,825	3.5	521	21.7
VII.....	17, p. m.	48	125	30, p. m.	35	76	3,400	4.5	756	31.5
	25, a. m.	45	117				2,750	5.5	500	20.8
Sums.....							19,075	80.5	4,957	206.5
Mean of 8 paths.....							2,384		620	25.8
Mean of 30.5 days.....									625	26.0
Low areas.										
I.....	2, p. m.	27	97	6, p. m.	48	68	2,350	4.0	588	24.5
II.....	10, a. m.	29	88	13, a. m.	47	54	2,300	3.0	767	32.0
III.....	10, p. m.	33	115	14, p. m.	46	60	3,150	4.0	788	32.8
IV.....	13, a. m.	54	114	15, p. m.	48	68	2,200	2.5	880	36.7
V.....	17, p. m.	37	100	19, a. m.	30	95	775	1.5	517	21.5
VI.....	21, p. m.	51	120	25, a. m.	47	65	2,700	3.5	771	32.1
VII.....	24, a. m.	41	112	26, p. m.	45	84	1,850	2.5	740	30.8
VIII.....	25, p. m.	27	83	29, p. m.	46	60	1,850	4.0	462	19.2
Sums.....							17,175	25.0	5,513	229.6
Mean of 8 paths.....							2,147		689	28.7
Mean of 25.0 days.....									687	28.6

*September.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

Alabama.—Rainfall slightly above average, being decidedly excessive in a few eastern counties; frost of last few days proved damaging over northern half of State; some cotton damaged by rain; conditions generally favorable for maturing late minor crops.—*F. P. Chaffee.*

Arizona.—The month was generally warm, with brief periods of cool weather. Except at a few stations, the weather was dry and unfavorable for fall seeding. There is very little feed on the ranges.—*M. E. Blystone.*

Arkansas.—Cloudy, damp, and rainy weather during the first week caused much cotton to rot and sprout in the bolls and greatly delayed picking. During the remainder of the month the weather was favorable for gathering crops and caused some improvement in cotton; picking and ginning progressed rapidly and cotton was marketed almost as fast as ginned. The yield of corn was generally good. Sowing of wheat progressed rapidly and considerable had come up to good stands at the close of the month.—*Eduard B. Richards.*

California.—Nearly normal weather conditions prevailed throughout the State, and the late crops were mostly under shelter before the heavy rains at the close of the month. Late grapes on the vines were considerably injured, but raisins and deciduous fruits on the trays were not materially damaged, as ample warnings were given. The first carload of oranges was shipped from Porterville on the 31st.—*Alexander G. McAdee.*

Colorado.—Conditions were exceptionally favorable to the ripening of late fruits. While precipitation on the eastern slope interfered materially with the digging of beets and late potatoes, it put the soil in fine condition for plowing and seeding. Wheat and rye, as a rule, germinated well. The yield of sugar beets is below the average; digging progressed very favorably during the latter half of the month, but at its close one-half of the crop was still in the ground.—*F. H. Brandenburg.*

Florida.—The first decade was generally favorable for harvesting cotton and corn. The second and third decades gave too much rain in some sections for vegetables on low lands. Sweet potatoes improved and the crop will be larger than expected. Oranges advanced toward maturity, and a good lot was disposed of; the fruit, however, was far from being in prime condition. The condition of citrus trees, pineapples, and vegetables is very satisfactory.—*A. J. Mitchell.*

Georgia.—Temperature averaged about normal, but much higher than

October, 1901. The rainfall was unevenly distributed, being very heavy in some southeastern counties. Light frosts in northern and middle counties on 15th and 16th; light to heavy frosts, except in extreme south on 29th and 30th. Relatively little seeding done, ground too hard and dry to plow. Cotton picking practically completed. Yields of sweet and Irish potatoes and cane excellent.—*J. B. Marbury.*

Idaho.—There were no general storms during the month. This resulted in the largest deficiency of precipitation of any October since 1895. The weather conditions were favorable for harvesting late apples and vegetable crops, but fall plowing and wheat seeding were delayed. Stock on the range suffered in consequence of short grass and drinking water, incident to the light rainfall. In many agricultural sections vegetable crops attained to full maturity before the arrival of a frost sufficiently heavy to kill.—*S. M. Blandford.*

Illinois.—The greater part of the month was warm, but on the 13th and 14th in the northern portion and on the 29th in the southern, freezing temperatures occurred. The rainfall was sufficient and well distributed in the northern and central districts, but was deficient in the southern. Corn matured rapidly and was generally being cribbed in good condition. Seeding of wheat and rye made rapid progress. Early sown wheat was making good growth, though dry conditions and the hessian fly combined to retard its growth in the southern districts. Pastures were everywhere good.—*Leon J. Guthrie.*

Indiana.—First decade of month showery, with temperature slightly below normal. Corn dried slowly, some damaged in shock. Thrashing clover delayed and some seed lost. Fall plowing and planting retarded. Balance of month temperature above normal and weather comparatively dry. Fall seeding practically completed. Wheat up to a good stand, but early planted was damaged by flies. Corn dried and cribbing commenced. Pastures good. Hog cholera prevalent in some localities; most stock in fine condition.—*W. T. Blythe.*

Iowa.—The month was favorable for farm work and drying the corn crop, except in portions of central and southern section, where rainfall was excessive. Corn gathering in progress, with more than the usual amount fit only for immediate feeding. Considerable progress in plowing. Fall pasturage extra good. Potato crop fair, and apples better than early reports indicated.—*John R. Sage.*